Modernized Biomass Utilization

Location: Jilin Province, Hechengli Village
Type: New construction of a biomass gasification combined heat and power project
Size: 14,000 m³ of gas per day for cooking and heating and 200 kW of electricity
Funding: Total: US$1,994,000
Private: US$254,000
Public: US$1,740,000
Objective: To provide cooking gas, heat, and electricity to village communities in China.
Duration: 2000–2004
Scale: Rural

Summary

This combined heat and power project in Northeast China will show that existing agricultural residues can be converted into a clean, modern energy carrier that improves the lives of local villagers. The production of gas for winter heating and the generation of electricity for sale to the local grid makes the project economically attractive and is expected to lead to project replication.

In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development

Activities that have increased awareness, knowledge, and skills of sector professionals in commercial business practices, which, in turn have helped attract private financing, include awareness and educational workshops for decision makers, skills-oriented training for decision makers and staff, study tours, stakeholder partnerships and exchanges, dissemination of best practices, and participation in international forums and workshops.

Increased public knowledge of, and participation in, energy decision making — a central element of energy-sector reform efforts — has been facilitated through programs in professional training.

Financing

Total project investment from all sources is US$1,994,000, of which US$734,000 is for capital costs.

Private equity, in the amount of US$254,000 comes from Hechengli Village Enterprise, a local community group. Other funding comes from the United Nations Development Program (UNDP), via a US$480,000 equipment grant, and US$760,000 in UNDP technical, business plan, and impact assessment support. The Jilin Environmental Protection Bureau is providing $500,000 for design, training, evaluation, and dissemination.

The Project

The project will demonstrate the technical, economic, and market viability of a modern biomass gasification system to provide cooking gas, heat, and electricity to village communities in China.

Jilin Province is an ideal location for the project, because it has abundant biomass resources, the need for rural development, an emerging industrial base, and the government commitment needed to ensure sustained growth of such a new industry. The project was designed to be consistent with UNDP's corporate policy on sustainable energy, which promotes the provision of sustainable energy services as a means of addressing multiple social, economic, and environmental bottlenecks to human development.

The residents of Hechengli Village will receive clean gas for heating and cooking, which will reduce indoor air pollution and its associated adverse health impacts. The gas will be two-thirds the price of liquefied petroleum gas (LPG) and will compete with coal. Outdoor air pollution will be improved because less surplus agricultural residues will be burned in the fields. The village standard of living will be improved, and women and children will have more time available for productive activities. The project will create jobs, and the sale of biomass residues to the project will generate revenue for the poorer villagers. The electric company will benefit from this distributed electricity generation from a renewable resource.

Construction is nearing completion, and following a trial production period, full operation is scheduled for December 2002.

Technical Data

The project will use thermochemical gasification of crop residues (corn stalks and leaves) to provide a clean-burning gas for cooking, heating, and electricity generation. The plant will consist of biomass preparation and feeding equipment, three gas generation systems rated at 600 m^3 of gas per hour, a 500-m^3 gas storage tank, a piping distribution network to the households, and a 200-kW gas-engine generator interconnected to the electricity grid. All systems will use commercially proven equipment.

Performance Data

The project will meet the entire cooking and heating demand for the village, which consists of 224 households. The net electric output, after plant loads are met (about 140 kW), will be sold to the local electricity grid.

The project will generate about US$140,000 of revenue from the sale of gas, electricity, and ash fertilizer. It will employ about 15 villagers, who will be trained in the operation and maintenance of the system, and it will pay about US$25,000 to local farmers for the biomass residues.

A reduction of about 2,400 tons of carbon dioxide (CO_2) equivalent warming potential is expected due to reduced coal-based electricity generation and the elimination of traditional biomass combustion for cooking and heating.

Participants and Roles

The project sponsors are the Jilin Environmental Protection Bureau and Hechengli Village Enterprise. The UNDP, with funds from the UN Foundation, is providing a grant to the project. Clean Energy Commercialization is providing technical and business planning support, and Princeton Environmental Institute is supporting the assessment of the project benefits.

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